Lumiax®

Smart™-CC series
Solar Charge Controller
(With constant current output function, can be used in solar street light systems)
User Manual

Dear Clients,

Thanks for selecting the **Smart™**-CC series solar controller. Please take the time to read this user manual, this will help you to make full use of many advantages the controller can provide your solar system.
This manual gives important recommendations for installing, program, using and so on. Read it carefully in your own interest please.

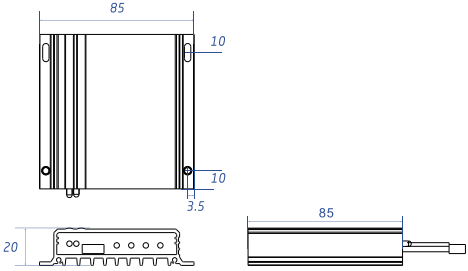
1.Description

Smart-CC series intelligent solar controller, is programmable and especially for DC solar street light system. It has constant current driver function, which can make the cost of the whole system much lower.

It comes with a number of outstanding features, such as:

- Can output constant current (output current can be set). Min: 0.1A
- Dimming function: 30~70% of rated power adjustable
- 6 modes for solar street light system
- 12/24V automatic recognition
- IP67 , Strong and durable aluminum case
- Digital Unit to confiure Smart charge controller via UART
- External temperature sensor, automatic temperature compensation
- Four stage charge way: fast, boost, equalization, float
- Full automatic electronic protect function

2.Dimensions



3.Safety instructions and waiver of liability

3.1 Safety

①The solar charge controller may only be used in PV systems in accordance with this user manual and the specifications of other modules manufacturers. No energy source other than a solar generator may be connected to the solar charge controller.

②Batteries store a large amount of energy, never short circuit a battery under all circumstances. We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the battery wiring.

③Batteries can produce flammable gases. Avoid making sparks, using fire or any naked flame. Make sure that the battery room is ventilated.

④Avoid touching or short circuiting wires or terminals. Be aware that the voltages on special terminals or wires can be as much as twice the battery voltage. Use isolated tools, stand on dry ground, and keep your hands dry.

⑤Keep children away from batteries and the charge controller.

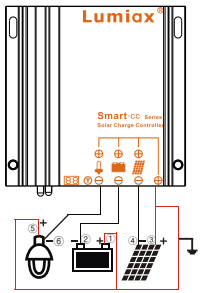
3.2 Liability Exclusion

The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

Ver:DD27
Subject to change without notice!

4.Installation

The following diagrams provide an overview of the connections and the proper order.



Remark: If the device is used in a vehicle which has the battery negative on the chassis, loads connected to the controller must not have an electric connection to the car body, otherwise the Low Voltage disconnect and electronic fuse functions of the controller are short circuited.

- To avoid any voltage on the wires, first connect the wire to the controller, then to the battery, panel or load.
- Make sure the wire length between battery and controller is as short as possible.
- Recommended minimum wire size:
  SM05-CC: 1.5 mm²; SM10-CC: 2.5mm².
- Be aware that the positive terminal of Smart are connected together and therefore have the same electrical potential. If any grounding is required, always do this on the positive wires.
- Connecting capacitive load may trigger short circuit protection.

5.Starting up the controller

5.1Self Test

As soon as the controller is supplied with battery, it starts a self test routine. Then the display changes to normal operation.

5.2System Voltage

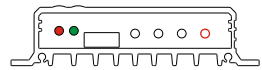
The controller adjusts itself automatically to 12V or 24V system voltage. As soon as the battery voltage at the time of start-up is within 10V to 16V, the controller implies a 12V system, else if the battery voltage is within 20V to 30V, the controller implies a 24V system.

If the battery voltage is not within the normal operating rang(ca.10 to 16V or ca.20 to 30V)at start-up, a status display according to the section **Error description** occur.

5.3Battery Type

The controller applies to Liquid and Gel battery, the factory default setting is suitable for liquid battery.

7.LED indications and Faults & Alarms



7.1LED Display Explanation

LED	Status	Function
Green	Slow flash(1s on/1s off)	float charging
	Flash(0.4s/0.4s)	Battery connected, day detected
	Fast flash(0.1s/0.1s)	Equal charging
	On	Battery connected, night detected
Red	Off	No faults detected
	Slow flash(0.5s/2s)	Dimming
Red Green	Off	No battery connected
	Lighted together (1second)	Controller start-up

7.2Faults & Alarms

Faults	Status	Reason	Remedy
Loads are not supplied	Red LED on	Battery is low	Load will reconnect as soon as battery is recharged.
	Red LED slow flash	Over current/ Short circuit / Over temp	Switch off all loads. Remove short circuit. Controller will switch on load automatically after max 1 minute.After the temperature reduces,the load opens automatically
	Red LED fast flash	Battery voltage too high(>15.5V/31V)	Check if other sources overcharge the battery. If not,controller is damaged.
		Battery wires or battery fuse damaged, battery has high resistance	Check battery wires, fuse and battery.
Battery is empty after a short time	Red LED on	Battery has low capacity	Change battery
Battery is not being charged during the day	Green LED on	Solar array faulty or wrong polarity	Remove faulty connection /reverse polarity

6.Low Voltage Disconnect Function (LVD)

6.1 Voltage controlled

Disconnect at a fixed voltage :
SOC1 10.8V/21.6V
SOC2 11.0V/22.0V
SOC3 11.5V/23.0V

6.2 State of charge (SOC) controlled:

SOC4:less than 10% battery soc
11.0V/22.0V ~ 11.7V/23.4V
SOC5:15% battery soc
11.2V/22.4V ~ 11.8V/23.6V
SOC6:30% battery soc
11.4V/22.8V ~ 11.9V/23.8V

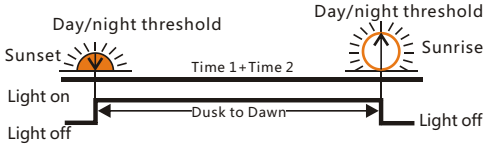
- If the controller goes into low voltage protection, it will restore only when the battery being recharged and the voltage reaching the reconnect voltage.
- Around oblique line value separately on behalf of 12V and 24V system's value.

8.Street-Light Function

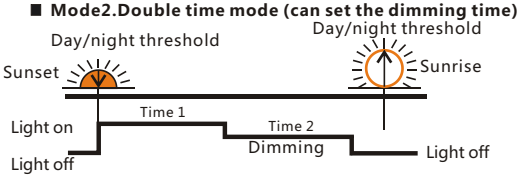
The Smart-CC solar charge controller comes with a sophisticated Street-light function. It controls the load output at night and is widely programmable.

There are 6 modes available:

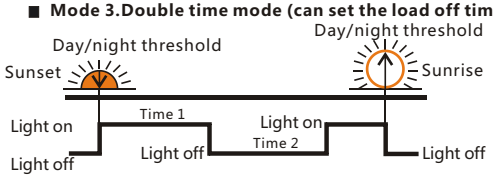
■ **Mode 1.Single time and Dusk to Dawn**



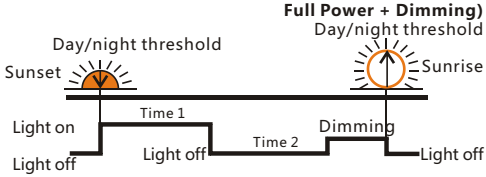
■ **Mode2.Double time mode (can set the dimming time)**



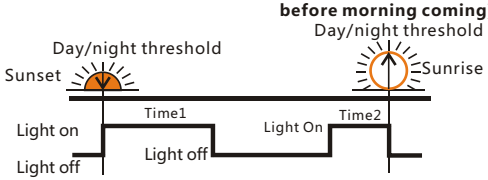
■ **Mode 3.Double time mode (can set the load off time)**



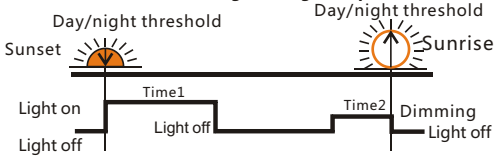
■ **Mode 4.Double time mode (can set the load off time, Full Power + Dimming)**



■ **Mode 5.Double time mode (can set the load on time before morning coming)**



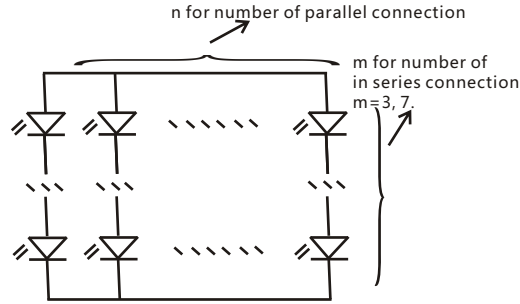
■ **Mode 6.Double time mode (can set the load on time before morning coming, Full power + Dimming)**



It will take effect in next day if the mode of controller is changed via Digital Unit.

9.Recommended connection of LED lights

Following connect ways is for the LED lights (Vf: 2.9V~3.4V; Power: 1W)



Model	Voltage	Setting range of load current	Recommendatory connect way
SM05-CC	12V	0.1A~2.5A	3 pcs/series, at most 7 series for parallel
	24V	0.1A~4.0A	7 pcs/series, at most 11 series for parallel
SM10-CC	12V	0.1A~5.0A	3 pcs/series, at most 14 series for parallel
	24V	0.1A~8.0A	7 pcs/series, at most 22 series for parallel

For example,1W LED,

12V/5A system,
for a 20W lamp, m=3, n=7.
If the LED current of each string is 300mA, you can set the load current to 2.1A.

24V/10A system,
for a 120W lamp, m=7, n=17.
If the LED current of each string is 300mA, you can set the load current to 5.1A.

- Considering the dependability of LED, we advise you keep the current as 90% of rated current.
- Forward voltage of LED could influence the performance of system, in case of any doubts consult your dealer.
- If the load current are set too little, the controller may go to over-current protection.

10.Default Settings

	Default Settings
Load control mode	Mode1(Dusk to Dawn mode)
Low voltage disconnect	SOC5
Low voltage reconnect	12.5/25.0V
Battery type	Liquid
Day/night threshold	3.0/6.0V
Load current	1.0A

You can configure Smart-CC solar charge controller with Digital Unit. See Digital unit manual for details.

11.Safety Features

	Solar terminal	Battery terminal	Load terminal
Reverse polarity	Protected *1	Protected *1	Protected *2
Short circuit	Protected	Protected *3	Switches off immediately
Over current	——	——	Switches off with delay
Reverse Current	Protected	——	——
Over voltage	Max.55V *4	Max. 40V	——
Under voltage	——	——	Switches off
Over temp.	switches off the load if the temperature reaches the set value.		

*1 Controller can not protect itself in a 24V system when polarity of battery or solar is reversed.
*2 Controller can protect itself, but loads might be damaged.
*3 Battery must be protected by fuse, or battery will be permanently damaged.
*4 The solar panel voltage should not exceed this limit for a long time as voltage protection is done by a varistor.

Warning: The combination of different error conditions may cause damage to the controller.
Always remove the error before you continue connecting the controller.

12.Technical Data

Model	**SM05-CC**	**SM10-CC**
Nominal voltage	12V/24V automatic recognition	
Max solar current	5A	10A
Setting bound of constant current	12V: 0.1~2.5A; 24V: 0.1~4.0A	12V: 0.1~5.0A; 24V: 0.1~8.0A
Precision of constant current	±5%	
PWM constant current frequency	100HZ	
Fast voltage	14.0V/ 28.0V (25℃)	
Boost voltage	14.5V/ 29.0V (25℃)	
Equalization voltage	14.8V/ 29.6V (25℃)(Liquid)	
Float voltage	13.7V/ 27.4V (25℃)	
Load disconnect voltage	10.8~11.9V / 21.6~23.8V (programmable)	
Load reconnect voltage	12.0~13.2V/24.0~ 26.4V (programmable)	
Lighting hours	0~18 Hours (programmable)	
Day/Night threshold	3.0~7.5V/6.0~15.0V (programmable)	
Battery type	Liquid, Gel	
Temperature Compensation	-4.17mV/K per cell (boost, equalization); -3.33mV/K per cell (float)	
Max solar voltage	55V	
Max battery voltage	40V	
Dimming	30~70% of rated power	
Cable length	120mm/80mm	
Over voltage protection	15.5 / 31.0V	
Dimensions /Weight	85 x 85 x 20mm/210g	
Wire size	1.5mm²	2.5mm²
Typical power consumption	< 13mA	
Ambient temp.	-40℃ ~ +60℃	
Case protection	IP67	
Max altitude	4000 m	